

Appl. No. 09/743,560
Amdt. dated December 8, 2003
Amendment under 37 CFR 1.116 Expedited Procedure
Examining Group

PATENT

REMARKS/ARGUMENTS

Claims 8 - 17 are pending. Claims 8, 9, and 12 were amended. No claims were canceled. No claims were appended.

Claims 8-11 and 16-17 were rejected under 35 U.S.C. § 103(a) for allegedly being unpatentable over Yamazaki et al., Japanese Patent Application No. 09-139,406. The instant Office action was made final.

In view of the following remarks and arguments, withdrawal of the finality of the Office action is requested, and reconsideration of the claims is sought.

The present invention relates to sample observation to identify defects on samples during semiconductor processing. An aspect of the invention recited in independent claim 8, for example, is "acquiring, at a first scale factor, a reference sample image not including any defect on a sample with an imager" and then "acquiring a defective sample image including the defect on the sample at the first scale factor." As disclosed in the specification, the reference sample image and the defective sample image are both acquired at a first scale factor. Claim 8 was amended to highlight this aspect of the invention. Independent claim 9, likewise, was similarly amended.

Claim 8 further recites locating a defect "by comparing the reference sample image and the defective sample image." A magnified image of the located defect is then acquired at "a second scale factor greater than the first scale factor with said imager without changing the position of the sample."

Independent claim 12 has been amended to recite the foregoing aspects of the invention. Independent claims 13 and 14 already recite these features and thus have not been amended.

1. Not Obvious to Modify Yamazaki et al. to Acquire a Reference Sample Image

Yamazaki et al. describe "a microscope adjusted to bring ... a foreign particle into its field of view." *Abstract*. An image (ST-1) is produced. Thus, the very first image is an image in which the microscope was adjusted to bring a foreign particle into view. Then a "secondary-

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electron image is divided into pixels 3 in an arbitrary matrix (ST-2), and ... each pixel is digitized into gray levels (ST-3)." *Id.* Yamazaki et al. appear to teach that the second image ST-2 is derived from the image ST-1. This is illustrated in the Abstract where image ST-2 appears to be image ST-1 with a grid (an arbitrary matrix). See also Fig. 1 on page 4.

The Office action correctly states that Yamazaki et al. "does not explicitly state acquiring a reference sample image not including any defect on a sample." *O.A. at page 2, last line to page 3, first line (underlining in the original)*. However, the Office action asserts

"it is known in the art that during the alignment of an apparatus which images specific areas having defects, that one also acquires images of areas not having the defect during the alignment while the imager is on. Therefore it would have been obvious to a person of ordinary skill in the art at the time the invention was made to acquire a reference sample image not including any defect on a sample with an imager" *O.A. at page 3, lines 7 - 12.*

On the contrary, it is not necessarily known in the art that, during the alignment of an imager, one of ordinary skill would acquire images of areas of a sample not having the defect. In fact, it seems more reasonable that in order to properly image a sample for any purpose, an alignment procedure first would be performed on some kind of a standard reference and not on a sample. If the alignment is performed on the thing to be imaged (instead of a reference), how would one know whether the collected data is correct or not?

Moreover, even if a reference image is acquired during an alignment process, Yamazaki et al. do not suggest that such a reference image would be used in their process. In fact, the very first image Yamazaki et al. produce is an image (ST-1) in which the microscope was adjusted to bring a foreign particle (a defect) into view; the very first image produced is not absent any defect. From that image, another image (ST-2) is produced. The Office action is silent as to how the Yamazaki et al. process would utilize a "reference sample image not including any defect on a sample" to produce another image, since Yamazaki et al. teach producing image ST-2 from image ST-1 which is not a reference sample image as recited in the pending claims.

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2. Yamazaki et al. Do Not Teach or Suggest Comparing with a Reference Sample Image

The Office action asserts that "Yamazaki ... teaches ... locating the defect on the defective sample by comparing the reference sample image and the defective sample image."

O.A. page 2, paragraph beginning with "Claims 8-11", line 1 and lines 6 - 8.

Yamazaki et al. describe "a microscope adjusted to bring ... a foreign particle into its field of view." *Abstract*. An image (ST-1) is produced. Then a "secondary-electron image is divided into pixels 3 in an arbitrary matrix (ST-2), and ... each pixel is digitized into gray levels (ST-3)." *Id.* Then a "peculiar point is moved to the center of the field of view of the microscope, and the magnification is changed so that the matrix can be observed (ST-4). Those steps are repeated until maximum possible magnification is reached." *Id.*

First, it is acknowledged in the Office action that Yamazaki et al. "does not explicitly state acquiring a reference sample image not including any defect on a sample." *O.A. at page 2, last line to page 3, first line (underlining in the original)*. Yamazaki et al. therefore do not teach locating a defect "by comparing the reference sample image and the defective sample image" since Yamazaki et al. do not acquire a reference sample image as recited in the pending claims.

Second, Yamazaki et al. start with an image ST-1 which includes a foreign particle (a defect). Then they form image ST-2 by dividing ST-1 with an arbitrary matrix. Then they form image ST-3 by digitizing the pixels in ST-2. Then they form image ST-4 by focusing on an area in ST-3 and increasing the magnification. Then they repeat those steps. There is simply no suggestion to incorporate "a reference sample image not including any defect on a sample" the foregoing described process. Moreover, the foregoing does not include a comparison of one image to another to identify a defect. Each subsequent image in Yamazaki et al. is produced by some form of processing on the previous image; e.g. dividing by an arbitrary matrix, digitizing pixels. There are no comparison operations.

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CONCLUSION

In view of the foregoing, the Section 103 rejection is believed to be overcome. Since the claims as amended do not change the scope of the claims, only to clarify, a withdrawal of the finality of the Office action is earnestly sought and reconsideration of the claims is respectfully requested.

Applicants believe all claims now pending in this Application are in condition for allowance and an action to that end is respectfully requested. If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at 650-326-2400.

Respectfully submitted,


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